3.B

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CONVERSION ELECTRONS IN THE DECAY OF Ag^{106m} TO Pd^{106}

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Abstract: The internal conversion spectrum in the decay of Ag^{106m} to Pd^{106} was obtained by means of an iron yoke double focussing spectrometer. Transitions of the following energies were determined with an accuracy of about 5×10^{-4} : 195.0, 221.5, 228.5, 328.3, 390.9, 406.0, 429.5, 450.8, 474.2, 511.8, 600.9, 616.1, 680.3, 703.3, 716.2, 717.1, 748.3, 792.8, 803.9, 807.5, 824.5, 847.5, 1045.7, 1127.8, 1199.1 and 1222.8 keV.

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RADIOACTIVITY Ag^{106m} [from Pd (d, *x*n), Rh^{103} (α, n)]; measured cc, K/L. Pd^{106} deduced possible levels.

1. Introduction

The decay of Ag^{106m}(8.3d) to Pd^{106} has been the object of several investigations[1]). Recently Smith[2]) obtained accurate transition energies up to 823 keV using permanent magnets. Previously Hayward[3]) and Alburger and Toppel[4]) had also given some higher energy conversion lines, but the precision of the measurements was lower. In our investigation[5]) of the decay of Ag^{105}, several lines of Ag^{106m} were observed in the first runs. An analysis of the data corresponding to Ag^{106m} was made later, and since some new facts were observed and the energy determinations had a better precision than those of the previous measurements the results are presented here.

2. Measurements and Results

The conversion electrons were measured with a 50 cm radius iron yoke double focussing spectrometer set at a resolution of 0.18%. Details of the instrumental conditions were given in ref.[5]) and the source used was the one described there as source I. The results are reported in table 1.

The conversion electron spectrum was scanned from 110 to 1270 keV. The calibration was performed against the F line of ThB and the 662 keV transition of Cs^{137} (see ref.[5])). A comparison of our energy and intensity values with those reported by Smith, shows that they are in fairly good agreement. Above 600 keV Smith's energy values tend to be lower than ours, but there is still agreement within the errors.

TABLE 1
Internal conversion results

Present work					Smith[2])		
Adopted transition energy (keV)	Electron energy (keV)	Conversion shell	Relative electron intensity	K/L	Transition energy[a]) (keV)	Relative electron intensity[b])	K/L
					110.1[c])	21	
					166.8	w	
194.93 ± 0.15	170.58	K	44 ± 6		195.0	62	
221.51 ± 0.10	197.16	K	630 ± 50	7.0 ± 0.9	221.5	760	8.5
	217.96	L	90 ± 9			91	
	220.9	M	15 ± 5				
228.53 ± 0.12	204.18	K	67 ± 8		228.6	93	
	224.9	L	12 ± 5				
					282.0	w	
328.27 ± 0.25	303.92	K	32 ± 16[d])		328.1	88	
					374.4	w	
390.90 ± 0.20	366.55	K	98 ± 25		390.7	115	
					396.5	w	
406.00 ± 0.15	381.65	K	300 ± 20		405.8	318	
	402.6	L	30 ± 10				
					418.5	w	
429.46 ± 0.15	405.11	K	260 ± 20		429.6	280	
450.80 ± 0.20	426.45	K	160 ± 15[e])		450.6	158	
	447.27	L	17 ± 5				
					457.3	w	
474.2 ± 0.3	449.8	K	17 ± 5		474.3	w	
511.77 ± 0.20	487.42	K	1000 ± 40	7.9 ± 0.8	511.6	1000	8.5
	508.10	L	127 ± 10			118	
	511.2	M	20 ± 5				
					585.7	w	
600.88 ± 0.25	576.53	K	15 ± 4		600.9	≈18	
616.05 ± 0.25	591.70	K	155 ± 15		615.6	167	
	612.6	L	16 ± 5				
680.3 ± 0.6	655.9	K	f)		679.8	w	
703.3 ± 0.5	679.0	K	30 ± 10		702.6	≈18	
716.2 ± 0.4	691.8	K	} 130 ± 10		717.1	140	
717.1 ± 0.4	692.7	K					
					737.6	w	
748.2 ± 0.3	723.9	K	37 ± 4		747.2	42	
792.8 ± 0.3	768.5	K	24 ± 3		792.1	32	
803.9 ± 0.3	779.6	K	40 ± 4		802.8	35	
807.5 ± 0.5	783.1	K	12 ± 3[d])		807.1	≈18	
824.5 ± 0.3	800.2	K	54 ± 5		823.4	58	
	820.8	L	≈6				
847.5 ± 0.4	823.2	K	14 ± 4				
1045.7 ± 0.4	1021.3	K	48 ± 4				
	1042.0	L	≈5				
1127.8 ± 0.5	1103.4	K	13 ± 3				
1199.1 ± 0.6	1174.7	K	13 ± 4				
1222.8 ± 0.6	1198.5	K	8 ± 3				

Footnotes *a*)-*f*) see next page.

Indications of weak transitions were found at 623.1±0.5 and 1019.3±0.7 keV (not mentioned in table 1). The transition known at 717 keV is composed by two transitions (see fig. 1). A ray at 847.5 keV (also shown on fig. 1) was not observed by Smith, in spite of the fact that he studied the energy region below 935 keV. The four lines reported above 1 MeV were known from investigations by Hayward[3])

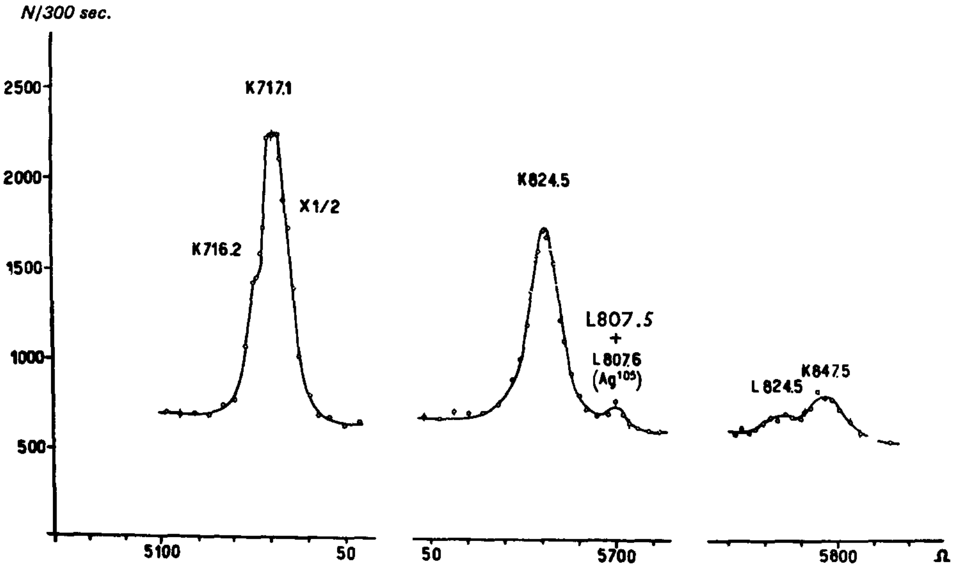

Fig. 1. Parts of the internal conversion spectrum.

and by Alburger and Toppel[4]), but the present energy values are much more accurate. Some features of Smith's level scheme are supported by the energy sums shown in table 2. They also give an idea of the magnitude of the relative erroıs in our transition energy determinations.

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[a]) Absolute errors estimated by Smith to be ≈ 0.1%.
[b]) Errors estimated by Smith to be ≈ 20%.
[c]) Out of the region scanned by us.
[d]) Transition energy coincides with that of a Ag^{105}(40 d) line.
[e]) 20% of this intensity may be attributed to L429.
[f]) Not resolved from Ag^{110m}(270 d) and Ag^{105}(40 d) lines.

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TABLE 2
Energy-sum relations

E_i (keV)	E_j (keV)	E_{ij} (keV)
194.93	406.00	600.9
	600.88	600.9
429.46	616.05	1045.5
	1045.7	1045.7
511.77	616.05	1127.8
	1127.8	1127.8
390.90	807.5	1198.4
406.00	792.8	1198.8
450.80	748.3	1199.1
	1199.1	1199.1
429.46	792.8	1222.3
	1222.8	1222.8
600.90	792.8	1393.7
194.93	1199.1	1394.0
429.46	1127.8	1557.3
511.77	1045.7	1557.5
429.46	1199.1	1628.6
803.9	824.5	1628.4
406.00	1228.8	1628.8

Note added in proof: In a very recent paper (Phys. Rev. **131** (1963) 351), Smith reports the detection of the last five K-conversion lines given on table 1, plus one line corresponding to a transition of 1528.5 keV.

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